Space Weather Forecast

Issued on Monday, 07 August 2023 at 13:18 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor/Moderate storm likely from CME arrivals Days 1-2 (07-8 Aug). R1-R2 Radio blackouts with slight likely with slight chance R3 Day 1 (07 Aug).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is Moderate with two Moderate flares observed from the complex region near the western limb, which was also the source of the Strong flare on 05 Aug. This region has recently rotated beyond the horizon, making it no longer possible to analyse. Despite this, further activity will likely be observable from this region through day 1 (07 Aug) with its magnetic canopy still visible in SDO imagery. There are two other regions of note, amongst the ten total sunspot regions. The first is also in the northwest, but is a small region that has an unusual orientation of its opposite polarity spots that can indicate an increased potential for flaring. The other in the southeast and is dominated by a large mature spot, but has seen some small spot development around its periphery.

No Earth-directed CMEs (coronal mass ejections) were observed in the last 24 hours, with the CME from the Moderate flare a clear miss, passing ahead of Earth.

Solar Wind / Geomagnetic Activity: Solar winds showed the exit from a weak magnetic cloud into background slow-ambient wind. However, solar winds increased briefly to slightly elevated levels shortly after 07/0000 UTC, peaking at near 450km/s, probably due to a passing weak transient feature, before winds declined back to current slow-ambient levels. However, solar winds have recently increased to slightly elevated, peaking at 480km/s, with the arrival a CME at 07/1100 UTC. The total interplanetary magnetic field strength was Weak to Moderate. The all important north-south component was initially weak and towards the north (positive). A marked change to more turbulent conditions then occurred from 07/0000 UTC, due to a possible weak transient feature passing Earth, before declining back to weak values. However, the north-south component became weakly negative again at 07/1100 UTC due to the arrival a weak CME. Geomagnetic activity was mostly Quiet (Kp0-1), with an Unsettled (Kp 3) interval observed at 07/0000-0300 UTC.

Energetic Particles / Solar Radiation: The observed count rate of energetic particles (high energy protons) is now below the S1 threshold, after recent activity from the Moderate and Strong flaring from the complex region, which has now rotated around the northwest limb. The count rate remains slightly above background however.

Four-Day Space Weather Forecast Summary

Solar Activity: Further Moderate flares are likely day 1 (07 Aug) mainly from the sunspot that produced the recent Strong flare, from just over the northwest limb. There is a slight chance of a further isolated strong flare. This risk decreases day 2 (08 Aug) onward with activity becoming mainly Low but with a chance of rising to Moderate.

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Solar Wind / Geomagnetic Activity: There are a number of potential CME arrivals day 1-2 (07-08 Aug), primarily from the flaring of AR3386 on the 04-05 Aug. These are most likely to give a series of glancing impacts, however confidence remains low and they could yet miss, or could combine or arrive concurrently to give a more significant enhancement. Quiet geomagnetic activity at first has the potential to become Active to G1 Minor Storm, with G2 Moderate storm intervals, with any CME arrivals. There is a slight chance of G3 Strong storms, mainly early on 08 Aug. Any enhancement is expected to ease day 3 (09 Aug) onward.

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to continue declining day 1 and 2 (07 and 08 Aug) but with a chance of rising again with any flares that occur from the region that was the source of the previous enhancement. This gives a slight chance of further S1 Minor Radiation Storms, mainly day 1 or 2.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	60	70	30	1
Strong	G3	No	10	15	1	1
Severe	G4	No	1	2	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	40	40	40
Very Active	R3 to R5 X	No	15	5	5	5

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Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	20	15	5	5
Very Active	**≥ S3 ***	No	2	2	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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